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ABSTRACT

This study investigates the pattern of teacher questioning regarding three elements: sequence, student respondent, and cognitive process. The rationale for this type of teaching rests on the claims for teaching students the process of critical (reflective) thinking. In this type of teaching it is necessary to have data before the students. Only then is the teacher to ask the students for conclusions. Six cognitive processes, which the respondent is to perform as solicited by the question, are identified: (1) defining; (2) interpreting; (3) fact stating; (4) explaining; (5) opining; and (6) justifying. Classroom observation indicates that teachers are more likely to have a question and answer exchange with one student at a time rather than broadening the interaction into group discussion. The implications of this study are that teachers need help in creative questioning in order to elicit thoughtful reasoning and response from students. (JD)

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QUESTIONING IN THE CLASSROOM

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With just a casual visit to the local elementary school or high school, an observer quickly notices that question asking is a common phenomenon in the classroom. A formal visit yields observational data to convince even the strongest of doubters about this phenomenon of classroom teaching. With pad and pencil and a focus on the flow of the discourse it is possible to record specifically what the teacher and students are doing as they interact verbally. Thus, the issue for the observer is not whether there is question asking but rather what is the pattern of teacher questioning in the classroom.

As with other aspects of life, meaning about a set of events comes when a general picture is drawn which relates those events to each other and to other sets of events. It is not enough just to know that teachers ask questions. To understand teaching in the classroom it is necessary to know what kinds of questions teachers ask, in what sequence, in what proportion as compared to students, to whom, and for what apparent or inferred reasons. By understanding teaching based on such knowledge, it is then possible to relate teaching to curriculum, to school organizational structure, and to societal expectations about schooling and to purposes for schooling. It is then possible to help teachers change their classroom activity if it is desired in order to bring together the multiple aspects of teaching and schooling.

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The determination of a pattern of questioning is important not only for the observer-analyst but also, and perhaps even more so, for the teacher. Teachers, when requested to estimate how many questions on the average they ask when teaching, generally underestimate the amount significantly. Research shows that the number of teacher questions per half hour ranges from 45-150, yet teachers estimate only 12-20.[1] The recognition of a pattern within those questions is obviously all the more difficult to come by, yet necessary, if the teacher is to understand what is going on in the classroom.

That a pattern exists in a teacher's classroom activity is a fact long established by the common sense term "teacher style" and one confirmed by recent research.[2] It is also true that different patterns arise within classrooms and have different effects. This is so in regard to nonverbal behavior as well as to teacher questioning. An example not related to questioning allows us to recognize this point clearly: teachers who generally circulate among their students in an open classroom as the students do their projects develop a warmer relationship with the students than teachers in regular classrooms.[3] Yet, if teachers do not know what pattern their activity develops, it is impossible to identify the effects of teaching and to decide what future action to take. Again, for example, what action should teachers take if they wish to be warmer with the students? Should teachers change their methods of teaching if they wish to foster student questioning? What can and should teachers do who wish to ask fewer questions? What kinds of questions in

what sequence will yield an inductive procedure which permits students to draw generalizations for themselves?

To observe classroom questioning is to focus on the teacher. Teachers ask many more questions than students and devote more of their pedagogical moves to questioning than anything else. In high school, teachers ask about 87% of the substantive questions (that is, questions directly on the content under study) while students ask only about 13%.[4] High school teachers devote about 47% of their pedagogical moves to soliciting,[5] which includes questioning and giving directions, while first grade teachers devote 61%[6]. In junior high school teacher soliciting moves constitute 32.3% of all classroom moves whereas in high school they constitute 28.8%[7]. Contrary to what some people believe, students ask few questions in the classroom: (1) Dodl found that of 43,531 "behavior incidents" in his study only 728 were student questions;[8] (2) high school students devote only 11% of their pedagogical moves to questioning[9] while first grade students devote 14.6% to questioning;[10] (3) students ask less than two questions per half hour;[11] and in junior high school pupils ask fewer questions than high school students.[12] In general, then, in high school, junior high school, and elementary school, the teacher asks more questions than the students.

These data allowing the observer to focus on the teacher simplify somewhat the task of determining a pattern in the classroom. Indeed, they indicate the first outlines of a pattern for they show that overall, in the classroom it is

the teacher who asks questions on the topic under study. To examine these teacher questions for a pattern a three-part framework is necessary and adequate.

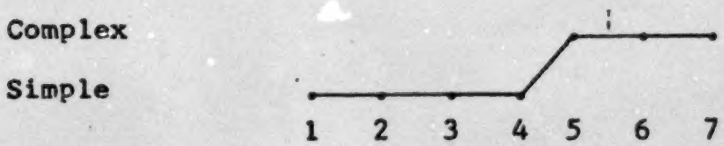
First, via the Bellack[13] system of analysis it is possible to categorize six cognitive processes which the respondent is to perform as solicited by the question. The six categories, falling into three groups are (1) Defining and (2) Interpreting in the Analytic group, (3) Fact Stating and (4) Explaining in the Empirical group, and (5) Opining and (6) Justifying in the Evaluative group. In each group the second type listed is the more complex than Fact Stating in that there is comparing of facts, giving reasons for events, and showing the effects of events on other events. In short, in Explaining there is a focus on relationships, and this focus constitutes making Explaining more complex than Fact Stating. The Categorizing of questions into these cognitive processes yields data to describe, in one important way, what kinds of questions teachers ask.

Second, via the concepts of plateaus questioning and peaks questioning, it is possible to describe a sequence of questions. In plateaus questioning, the teacher asks a series of questions of the same type before asking a more complex question requesting a comparison of or reasons for the previous responses. For example, a teacher may ask, "When was Watergate?" "Who was involved in Watergate?" and "Where did Watergate occur?" so as to elicit Fact Stating about Watergate. Thus staying on the Fact Stating level for a while before asking, for example, "Why did Watergate occur?" constitutes a

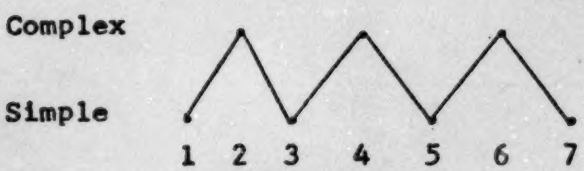
plateaus questioning sequence.

In a peaks questioning sequence the teacher asks a question and immediately goes to a more complex question so as to elicit a more complex process about the previous response. For example, a teacher may ask, "When was Watergate?" (Fact Stating) and follow with "Why did Watergate occur then?" (Explaining). A new vertical sequence may begin when the teacher returns to a less complex type of question. In peaks questioning the teacher does not stay on a plateau but goes back and forth between a "simple" question and a "complex" question.

If we plot out the questions in sequence, we can see why the labels "plateaus" and "peaks" were chosen for the two types. Plateaus questioning looks like this:



Peaks questioning looks like this:

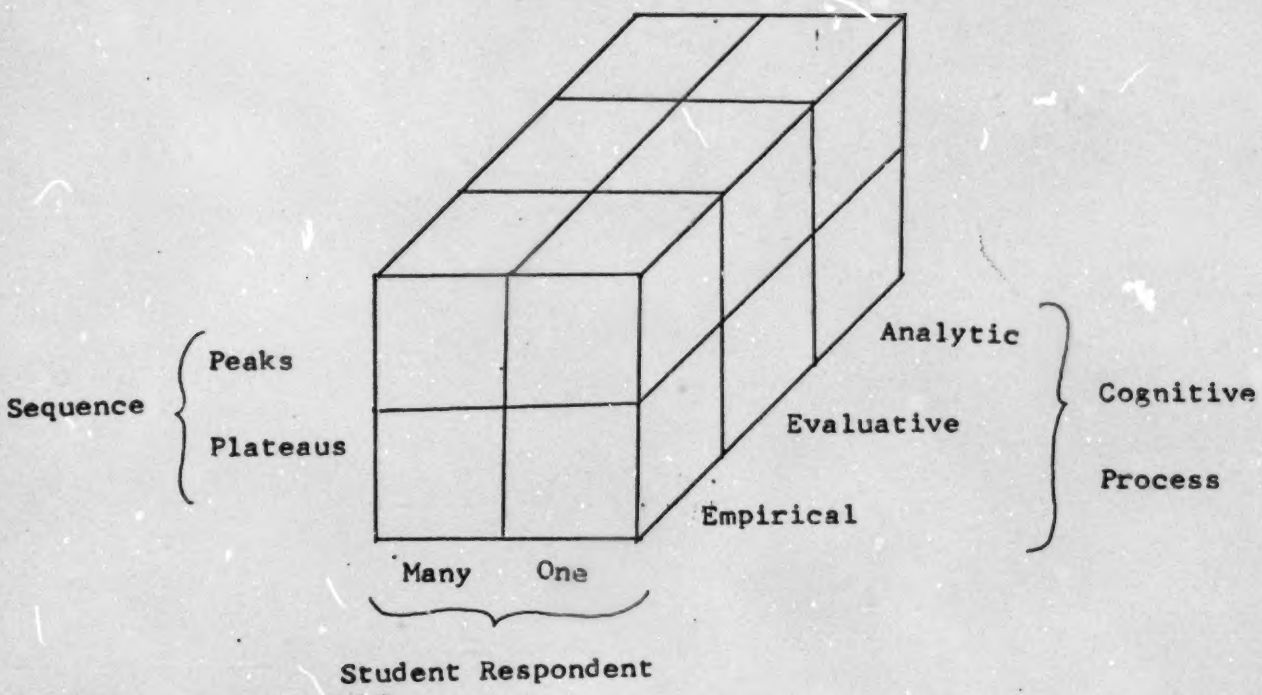


Third, by recording who is the respondent of the question asked by the teacher it is possible to determine if the teacher is questioning one student at a time or more than one student at a time. It is possible to have a plateau sequence with one student or many students just as it is possible to have a

peak sequence with one student or many students.

The combination of these 3 elements of the framework yields the following 3 x 2 x 2 cube which serves as a focusing device for observation:

FIGURE 1

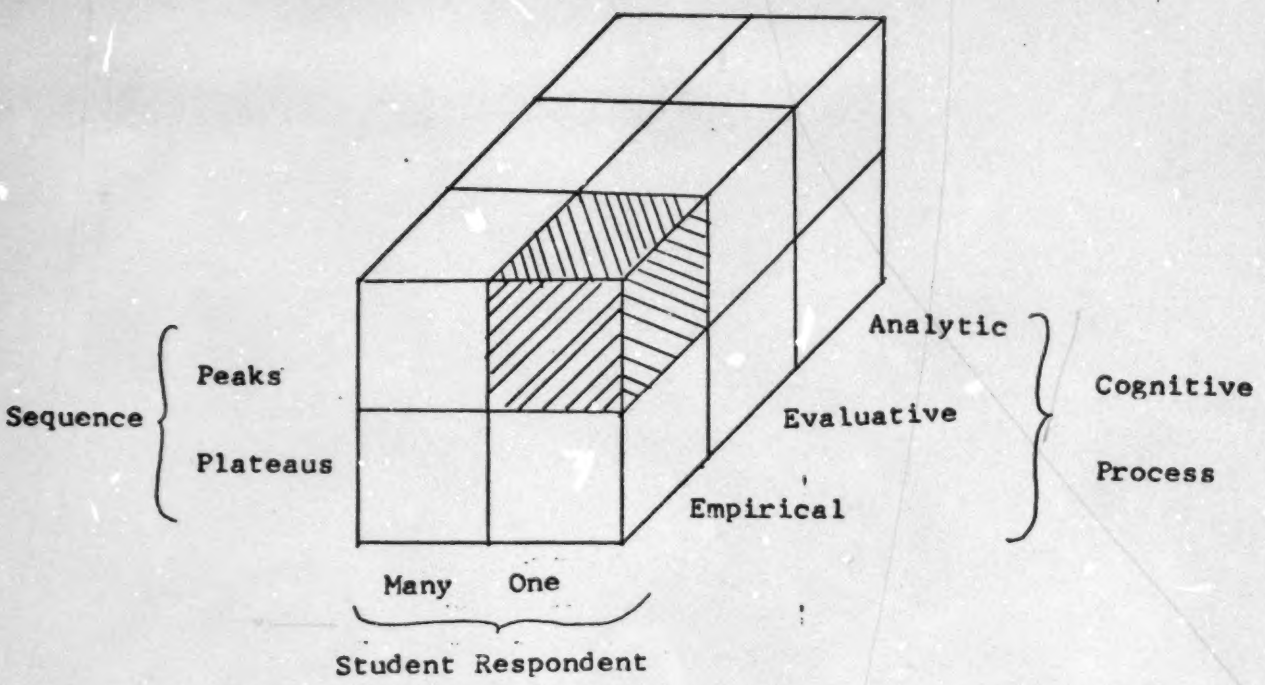


Given this framework it is possible to raise several significant questions about the classroom questioning activity of teachers. Do teachers favor the plateaus type more than the peaks type of questioning? Do teachers question one student at a time or many students at a time? For which cognitive process do teachers question most? Does one of the 12 cells of the cube dominate?

Six teachers agreed to have an observer gather data in their classrooms. These teachers were not aware of the focus of the observation. The six volunteers teach in the areas of Social Studies, English, and Science in a new suburban New York City high school, grades 7-11. There was no attempt to achieve a controlled sampling of teachers in the school. Rather, the observer simply visited those teachers who permitted the observer in their classrooms. For purposes of this initial report the variety and number of teachers is adequate.

The observer analyzed the recorded data sheets to ascertain the cognitive process, sequence, and student respondents for the teachers' questions. The results show that about 95% of the questions are for the empirical process, about 90% are of the peaks type, and about 90% are directed to one student as respondent. That is to say, the data from the six teacher observations clearly indicate the strong use of <u>peaks</u> questioning with <u>one</u> student respondent involved in the <u>empirical</u> cognitive process. Figure 2 indicates this by showing the appropriate cell shaded in the cube. This one cell dominates in the classroom questioning activity of the teachers.

FIGURE 2



The data corroborate what Bellack, Kliebard, Hyman, and Smith found in the 1960's; that is, that the teacher asks questions involving the empirical process more frequently than questions involving the analytic and evaluative processes.[14] (In that study the percentages are 79.5 for empirical, 15.7 for analytic, and 4.7 for evaluative.) This is not a surprising result since a prime objective of schools is to teach students facts, comparisons among those facts, and explanations connected with them. Those educators advocating values education in our schools have long pointed out that teachers spend little time with students clarifying values, analyzing values, and resolving value conflicts. Indeed, their whole thrust has been to convince teachers of the importance of dealing with values and to show them ways of teaching values education. Obviously,

there is still a great need for advocates of values education to persevere in helping teachers to change.

Another result of this study may be known by some strategists, but to my knowledge it has not yet appeared in the educational literature. That is, in questioning for the empirical cognitive process, teachers rely on a peaks pattern with one student respondent. This interaction goes counter to the strategy proposed by educational reformers of the 1960's. The combined curriculum and teaching reform of the past decade calls for inductive teaching (or discovery or enabling or facilitative or heuristic or inquiry teaching, depending on which label you prefer.) The rationale for this type of teaching rests on the claims for teaching students the process of critical (reflective) thinking and for motivating students in coping with the topic at hand themselves.[15] In this type of teaching it is necessary to have data out on the floor before the students. Only then is the teacher to ask the students for conclusions, comparisons, or explanations of the facts. Note the plural ending on the words "conclusions," "comparisons," and "explanations" in the previous sentence. This way of teaching seeks to have students offer a range of conclusions, comparisons, and explanations so that they can generate and investigate alternatives. This all means that plateaus questioning is fundamental to inductive teaching. Indeed, the widely known Taba teaching strategies program clearly emphasizes this point.[16]

Someone might agree that in an inductive process following a Deweyan model of "the scientific method" people offer conclu-

sions whenever they gather data. That is, they do not wait until all the data are available before offering an explanation or conclusion to test the hypothesis formulated. However, such an argument does not at all oppose the above claim for plateaus questioning. Rather, it agrees with it in that a person is to gather enough data -- many relevant facts -- which will permit the testing of an hypothesis before doing that testing. Obviously, offering an explanation after each piece of information, as in a peaks sequence, is not consonant with hypothesis testing as advocated by a Deweyan approach. The formulating and testing of hypotheses as advocated in "the scientific method" requires an inductive approach through a series of plateau sequences.

Furthermore, for motivational reasons in our classrooms where there are more than 15 students included in a questioning lesson at one time, it is probably better to involve as many students as possible in the lesson. If the teacher conducts a question/answer "dialogue" with one student, other students often lose their interest and their stake in the class. It is difficult for the "outsiders" to attend to the progression of the questions and thus virtually impossible for them to participate in drawing conclusions and offering explanations for the data since they have little or no stake in the matter. This is not to claim that questioning one student at a time has no value at all. Rather, in general the involving of many students increases the resource pool for an intelligent discussion, the interest of the students, and the number of alternative conclusions and explanations.

What is at issue here is the almost total reliance on one

student at a time with peaks sequences. This means that a teacher asks a question of one student for a fact, follows with a question for an explanation, and then moves on to another student. For example, in its simplest form peaks questioning follows the pattern below:

Teacher:	When was Watergate?
Jonathan:	1972
Teacher:	O.K. Why did it occur then?
Jonathan:	That's when the campaign was for President.
Teacher:	O.K. Who was involved?
Ruth:	Dean and Mitchell and those other 2 guys.
Teacher:	All right. How were they involved?
Ruth:	They got involved in the cover-up mess.

It is this pattern which is incongruent with inductive teaching since it does not encourage the group of students to examine much data at one time in order for them to discover what those data add up to for themselves. Moreover, it allows but one student at a time to offer a fact and to explain that fact. It is not necessarily true that the person who offers some facts can best explain those facts. Thus, the resource pool for both facts and explanations is small in a peaks strategy. When we connect the three elements of questioning into one dominant cell of the cube, as shown in Figure 2, then we see the incongruence with curriculum and teaching reform as well as the paucity of experiences elicited by the teacher through questioning.

The implications of this brief report are many but one looms large -- teachers need help in questioning. It makes no

sense to provide "new curriculum" projects for teachers and students and then to counter those materials with a procedure at odds with the intent of the designers. Teachers need to be sensitized to the intentions of the "new curriculum" materials as well to understand the theory supporting recently developed curriculum materials and teaching strategies. In addition, and perhaps most important, teachers need help in framing questions to suit their students and the justified pedagogical demands of reformers whether they are knowledge oriented, skills and processes oriented, or values oriented.

In summary, this study investigates the pattern of teacher questioning regarding three elements -- sequence, student respondent, and cognitive process. The results indicate that one pattern, the teacher questioning one student at a time for the empirical process via peaks sequences, dominates all the possible cells in the 3 x 2 x 2 model developed here. The results show an incongruence with current curriculum and teaching reforms and indicate the pressing need for helping teachers to learn how to question in the classroom.

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